

What Can You Do?

Water Conservation Strategies for Developers & Builders

**Arizona Department of Water Resources
Tucson Active Management Area**

Introduction

Creating homes that are attractive, functional, cost effective and water-conserving requires an integrated approach. A home that demonstrates water use efficiency promotes water-conserving building practices throughout the community and is a powerful sales tool. Reduced water costs give the final product an advantage over more conventional houses.

Developers and builders can play an important role in the effort to reduce groundwater overdraft by increasing water use efficiencies in new housing. Innovative building decisions can affect the availability of water in the future and the quality of life in the Tucson Basin. Tucson is now pumping groundwater faster than it is being replenished, and in the last 50 years water levels in parts of the Tucson central well field have declined by as much as 200 feet. The groundwater level is not all that is dropping. Subsidence or the lowering of the land surface has occurred in the Tucson area and will continue as more groundwater is pumped. Central Tucson may subside up to 12 feet by 2025. Damage caused by subsidence can include structural damage, broken pipes, and increased repairs to infrastructure. In addition, as the groundwater level falls, the cost of water increases because deeper wells and more energy will be needed to pump water to the surface.

Incorporating water conservation into your development is not only a good idea, it can make meeting regulatory requirements easier and more cost effective. The efficient use of groundwater is necessary to meet the Tucson Active Management Area's (AMA) safe yield goal by the year 2025 as mandated by state law. Safe yield represents a long-term balance between the amount of groundwater withdrawn each year and the annual amount of natural and artificial recharge to the aquifer. In addition, State Assured Water Supply Rules require proof of a 100-year water supply for all new development and use of renewable non-groundwater supplies. A subdivision that uses less water will meet these requirements more easily.

Cities are the single largest water users in the Tucson AMA. In 1996 municipalities were responsible for 46% of total water use. Our expanding urban population will continue to increase overall water demand. However, the rate of that increase can be reduced through water conservation programs. Conservation practices and efficient plumbing devices are the most inexpensive and easiest way to reduce overuse. Every person in the Tucson AMA can participate in the conservation process. This brochure describes innovative planning and building methods to improve

efficiencies and achieve significant water savings for the community and the individual homeowner. Increased water use efficiency and water conservation can be introduced into the planning, design, and construction process at several points.

Community Planning & Development

Starting with the big picture, using alternative water sources can reduce dependence on groundwater for landscape irrigation. For example, reclaimed water can irrigate landscapes in common areas and also individual home landscapes. The building site, however, must be adjacent to the reclaimed water line. *Consult Tucson Water for reclaimed water line locations.*

Rainwater runoff is another alternative water source. Site hydrology, grading and hardscape plans can be integrated for maximum use of this water source to irrigate landscapes. For example, natural topography, streets, sidewalks, parking areas, and rooftops can be utilized to capture and direct runoff to irrigate on-site landscaping, recreational areas, common areas, and community gardens. *For more information on water harvesting contact the Arizona Department of Water Resources, Tucson AMA or U of A/ Pima County Cooperative Extension for a copy of **Harvesting Rainwater for Landscape Use**, a new manual describing both simple and complex water harvesting systems.*

Planning and incorporation of community swimming pools, turf recreation areas, community gardens, and community centers result in a greater sense of community for residents and may save water that would otherwise be used on individual lots. Concentration of water-intensive activity areas which are accessible to all residents, results in water savings because individual homeowners will not need to duplicate these features.

Preservation of native vegetation and natural open space are key factors in reducing runoff, erosion, and use of groundwater for irrigation. Plant and open space preservation can be achieved by not grading the entire site and protecting natural land forms and drainage patterns. Native plants exist and thrive without supplemental irrigation. Undisturbed native plants provide erosion control on steep slopes and drainage channels and discourage soil loss. Excessive runoff and erosion can be minimized by reducing the length and steepness of existing or created slopes.

Utility corridors can be located in disturbed or built-out areas to minimize site disturbance. Establishing strict construction limits around buildings and limiting staging areas to distributed areas or future building sites provide further protection to existing vegetation.

Plants that cannot be preserved in-place can be salvaged and used in common areas and streetscapes. Most communities in the Tucson Basin have native plant ordinances and development standards which set guidelines for the protection of native species.

Call your local Planning Department.

Implementation of deed restrictions for use of natives and drought tolerant plants in front yards and adoption of a community plant list stipulating acceptable species creates strong community guidelines. This in turn sets a high design standard and conservation ethic for the entire development. Design guidelines should also include rules about the preservation and enhancement of the existing desert landscape. Preserved native plants are aesthetically pleasing because they are compatible with the surrounding landscape. In addition, a wide variety of attractive, low-water-use plants appropriate for common areas and streetscapes are now available at nurseries. *Select plants from the **ADWR Low Water Use/ Drought Tolerant Plant List** available from the Tucson AMA. Check ADWR regulations and local ordinances.* Most local jurisdictions now require the use of low-water-using plants in public rights-of-way.

Building Siting & Orientation

Individual home sites or blocks of homes should be sited to preserve contiguous native vegetation and protect natural drainage areas. Cluster housing and zero-lot-line planning leave larger undeveloped areas that can be preserved as common open space. Common areas, streetscapes, and non-buildable areas would also benefit if native vegetation is retained and natural drainages are protected. This will also save time and money since irrigation of new plantings would not be necessary.

In addition, orienting housing units along an east/west axis saves water and energy by reducing the heat load and use of water for evaporative cooling. Average conventional evaporative cooler use with bleed off is 20,000 gallons per cooling season.

Model Homes

Model homes are effective for showcasing water-conserving ideas to potential buyers.

- Water-saving fixtures and appliances can be featured that are more efficient than those required by plumbing regulations. For example, horizontal axis (tumble action) washing machines used approximately **40% less water and 60% less energy** than conventional washers. Educational displays on their water and money saving benefits could also be included to encourage homeowners to make water conserving choices;
- Xeriscape landscape designs featuring low water use plants grouped by water requirements and solar exposure, use of drip irrigation and mulching;
- Water harvesting can be beautifully displayed in the model home landscape using gutters and hardscape to collect and deliver rainwater to landscaped areas.

- Water intensive landscape areas, such as turf and pool areas, should be limited to 20 percent or less of the landscapable area. Turfgrass areas if used at all, should be small and located in the highest use areas, generally in the back yard.
- Water features, if used, should be recirculating and located in shady areas, or if possible on the north or east side of the home to reduce evaporative losses.

Individual Homes

Technology and plumbing codes play a large role in indoor water conservation. Local, state, and federal plumbing code mandates enable homeowners to achieve significant water savings through the use of low-flow toilets, showerheads, and faucets. As a developer or builder you can also encourage homeowners to install more water efficient appliances, fixtures, and systems as they become available. Options such as dual plumbing systems allow the homeowner to utilize household waste water (greywater from sinks, tubs, showers, and washing machines) for landscape irrigation. Or, greywater systems could be installed during the construction phase for future greywater use, reducing the costs of retrofitting the system later. *Call Pima County Development Services for permit information.* Other opportunities also exist for installing additional water efficient fixtures and appliances.

A housing unit designed to maintain low interior temperatures reduces evaporative cooler water use and can be an excellent selling point. Such a unit would make use of efficient building design, methods and materials, and be constructed using high R-rated roof and wall insulation. The number of windows on the east, and particularly the west side would be reduced. Shading devices and outdoor structures, walls, and court yards would be installed to reduce indoor temperatures. Strategic placement of trees on the east and west sides of a building is the most effective and least expensive method for reducing interior temperatures and keeping water and electric bills low.

Installation of exterior landscape water meters at homes and common areas will allow better monitoring of landscape water use and will also reduce sewer fees.

When construction is completed homeowners should be provided with as-built drawings and documentation for all irrigation systems, appliances, and fixtures to enable them to better maintain their homes. Proper and timely maintenance practices ensure that all systems and appliances operate at full efficiency.

Developers and builders can maximize indoor conservation by placement and selection of water conserving systems, fixtures, and appliances, for example.

- Locate hot water heaters to minimize long hot water pipe runs. A looped plumbing system is the most efficient way to quickly move hot water from the water heater to shower, sink, and tub without wasting water that would otherwise go down the drain. ***An average of 15 gallons is wasted each time the hot water is turned on.***

- Water-conserving dishwashers use on average **60% less water** than conventional dishwashers and because less water is being heated, less energy is used.

Technology can also play a negative role in interior water conservation.

- Home water treatment systems **use 15-100 gallons of water per day.**
- Reverse osmosis systems **use 15-120 gallons of water per 1000 gallons of water processed.**
- Outdoor misters **use 21,600 gallons per month** to cool 1000 square feet of patio.
- Whirlpool bathtubs **use 21-63 gallons per fill**, and multiple shower head all contribute to the overuse of groundwater. By contrast **a low-flow shower head uses 2.5 gallons per minute** and a conventional tub filled halfway uses only **18 gallons.**

If water use technologies are used, other water-saving systems and fixtures should be installed to balance overall water use. Careful consideration of how water is used throughout the development and in individual homes can greatly reduce the inefficient use of groundwater both indoors and in the landscape.